COLD-WATER CORAL REEFS AROUND EUROPE - HOTSPOTS FROM THE CENTRAL MEDITERRANEAN

Wolf-Christian Dullo [1] *, André Freiwald [2], Andres Rüggeberg [1] and Marco Taviani [3]

[1] Leibniz-Institute of Marine Sciences (IFM-GEOMAR), RD 1: Ocean Circulation and Climate Dynamic, Paleoceanography, Wischhofstr. 1, D-24148 Kiel, Germany - cdullo@ifm-geomar.de

[2] IPAL, Institute for Paleontology, University of Erlangen-Nürnberg, Loewenichstr. 28, D-91054 Erlangen, Germany

[3] Marine Geology Division, ISMAR, Consiglio Nazionale delle Ricerche (CNR), Bologna, Italy

Abstract

Living deep-water coral ecosystems are far more prominent in the central Mediterranean as previously known. New sites of living corals have been identified and challenge the existing ideas of cool-water coral community distribution within the Mediterranean.

Keywords : Biogeography, Biodiversity, Cnidaria, Continental Slope, Eastern Mediterranean.

Europe is surrounded by huge deep-water build-ups mainly formed by *Lophelia pertusa* and *Madrepora oculata* [1]. These cold-water reefs form almost a barrier reef type system in a water depth from 1000 m in the south up to 200 m in the north. The Mediterranean so far has been known as a site of mainly dead cold-water coral assemblages dating from different glacial times. Occurrences of living corals are mainly restricted to isolated spots [2].

During R/V METEOR cruise M70/1 starting from La Valetta/Malta and ending in Heraklion/Crete in fall 2006 investigations concentrated on the central Mediterranean bathyal communities and their fossil left-overs. This cruise was a milestone cruise for the EU's FP-6 HERMES Project. Bathyal coral ecosystems were investigated along the steep margins of selected continental slope and seamount settings in the central Mediterranean Sea. New sites of cold-water corals (*Lophelia pertusa, Madrepora oculata, Dendrophyllia cornigera, Corallium rubrum*) have been identified using deployments of the deep-sea work-class ROV QUEST of MARUM, Bremen along the slopes of Malta Trough, Sicily Strait, Palinuro Seamount, off Santa Maria di Leuca, and Bari Canyon. With this ROV we were able to obtain high quality samples, video footages and stills to produce geo-referenced habitat maps.

After the Messinian Salinity Crisis, bathyal coral communities re-entered the Mediterranean Sea during the Late Pliocene. While the modern systems are poorly known, an excellent documentation of submerged Late Pleistocene and emerged Early Pleistocene fossil coral communities exists especially in southern Italy. Conducted radiocarbon-dating on Pleistocene corals indicate a former distribution peak during the Marine Isotope Stage 3, both in the central NE Atlantic and Mediterranean Sea. Since then, the bathyal coral ecosystem is in decline, at least in the Mediterranean Sea. The causes for this decline seem to be linked with the warming of the intermediate and deep Mediterranean water masses and with - episodic - strongly reduced amounts of dissolved oxygen in the water column. Next to the better understanding of the bathyal ecosystem response to global change, we produce habitat maps of present-day coral communities, their associated biodiversity and analyse geochemical signatures of the skeletal biota, as well as sedimentary and physical oceanographic environment. Our new findings require a re-evaluation of the controlling factors so far described governing the distribution of living deep-water coral ecosystems

References

1 - Freiwald A., Fossså J.H., Grehan A., Koslow T., Roberts J.M., 2004. Cold-water Coral Reefs. UNEP-WCMC, Cambridge, UK, pp 84.

2 - Taviani M., Freiwald A., Zibrowius H., 2005. Deep coral growth in the Mediterranean Sea : an overview. *In :* Freiwald A., Roberts J.M. (eds), Cold-water Corals and Ecosystems. Springer-Verlag Berlin Heidelberg, pp 137-156.